

# MPE TEST REPORT

<b>Applicant</b>	UAB TELTONIKA TELEMATICS
<b>FCC ID</b>	2A3HUFMM880
<b>Product</b>	Fleet Management System
<b>Brand</b>	TELTONIKA TELEMATICS
<b>Model</b>	FMM880-Q3AB0
<b>Report No.</b>	R2408A1081-M1V1
<b>Issue Date</b>	September 23, 2024

Eurofins TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC 47 CFR Part 1 1.1310**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

*Prepared by: Wei Fangying*

*Approved by: Fan Guangchang*

**Eurofins TA Technology (Shanghai) Co., Ltd.**

*Building 3, No.145, Jintang Rd, Pudong Shanghai, P.R.China*

*TEL: +86-021-50791141/2/3*

*FAX: +86-021-50791141/2/3-8000*

## Table of Contents

1	Test Laboratory .....	4
1.1	Notes of the Test Report.....	4
1.2	Test Facility.....	4
1.3	Testing Location.....	4
1.4	Laboratory Environment .....	4
2	Description of Equipment Under Test .....	5
3	Tune up and Antenna Gain .....	7
4	MPE Limit.....	9
5	RF Exposure Evaluation Result.....	11
	ANNEX A: The EUT Appearance .....	13

Version	Revision Description	Issue Date
Rev.0	Initial issue of report.	September 12, 2024
Rev.1	Updated information.	September 23, 2024

Note: This revised report (Report No.: R2408A1081-M1V1) supersedes and replaces the previously issued report (Report No.: R2408A1081-M1). Please discard or destroy the previously issued report and dispose of it accordingly.

# 1 Test Laboratory

## 1.1 Notes of the Test Report

This report shall not be reproduced in full or partial, without the written approval of **Eurofins TA Technology (Shanghai) Co., Ltd.** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. Measurement Uncertainties were not taken into account and are published for informational purposes only. This report is written to support regulatory compliance of the applicable standards stated above.

## 1.2 Test Facility

### FCC (Designation number: CN1179, Test Firm Registration Number: 446626)

Eurofins TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform measurements.

## 1.3 Testing Location

Company: Eurofins TA Technology (Shanghai) Co., Ltd.  
 Address: Building 3, No.145, Jintang Rd, Pudong Shanghai, P.R.China  
 City: Shanghai  
 Post code: 201201  
 Country: P. R. China  
 Contact: Fan Guangchang  
 Telephone: +86-021-50791141/2/3  
 Fax: +86-021-50791141/2/3-8000  
 Website: <https://www.eurofins.com/electrical-and-electronics>  
 E-mail: Jack.Fan@cpt.eurofinscn.com

## 1.4 Laboratory Environment

Temperature	Min. = 18°C, Max. = 25°C
Relative humidity	Min. = 20%, Max. = 80%
Ground system resistance	< 0.5 Ω
Ambient noise is checked and found very low and in compliance with requirement of standards	
Reflection of surrounding objects is minimized and in compliance with requirement of standards	

## 2 Description of Equipment Under Test

### Client Information

<b>Applicant</b>	UAB TELTONIKA TELEMATICS
<b>Applicant address</b>	Saltoniskiu st. 9B-1, Vilnius, Lithuania
<b>Manufacturer</b>	UAB TELTONIKA TELEMATICS
<b>Manufacturer address</b>	Saltoniskiu st. 9B-1, Vilnius, Lithuania

### General Technologies

EUT Description			
Model	FMM880-Q3AB0		
SN	MPY24AQ19001578		
Hardware Version	FMM880-11		
Software Version	FMB.Ver.03.28.07		
Frequency	Band	TX (MHz)	RX (MHz)
	GSM 850	824 ~ 849	869 ~ 894
	GSM 1900	1850 ~ 1910	1930 ~ 1990
	LTE-M Band 2	1850 ~ 1910	1930 ~ 1990
	LTE-M Band 4	1710 ~ 1755	2110 ~ 2155
	LTE-M Band 5	824 ~ 849	869 ~ 894
	LTE-M Band 12	699 ~ 716	729 ~ 746
	LTE-M Band 13	777 ~ 787	746 ~ 756
	LTE-M Band 25	1850 ~ 1915	1930 ~ 1995
	LTE-M Band 66	1710 ~ 1780	2110 ~ 2180
	LTE-M Band 85	698 ~ 716	728 ~ 746
	NB-IoT Band 2	1850 ~ 1910	1930 ~ 1990
	NB-IoT Band 4	1710 ~ 1755	2110 ~ 2155
	NB-IoT Band 5	824 ~ 849	869 ~ 894
	NB-IoT Band 12	699 ~ 716	729 ~ 746
	NB-IoT Band 13	777 ~ 787	746 ~ 756
	NB-IoT Band 25	1850 ~ 1915	1930 ~ 1995
	NB-IoT Band 66	1710 ~ 1780	2110 ~ 2180
	NB-IoT Band 71	663 ~ 698	617 ~ 652
	NB-IoT Band 85	698 ~ 716	728 ~ 746
Bluetooth	2400 ~ 2483.5	2400 ~ 2483.5	

	Bluetooth LE	2400 ~ 2483.5	2400 ~ 2483.5
Date of Testing	August 16, 2024 ~ August 19, 2024		
Date of Sample Received	August 12, 2024		
Note: 1. The EUT is sent from the applicant to Eurofins TA and the information of the EUT is declared by the applicant. 2. All indications of Pass/Fail in this report are opinions expressed by Eurofins TA Technology (Shanghai) Co., Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only.			

### 3 Maximum Output Power/ Tune up and Antenna Gain

The numeric gain (G) of the antenna with a gain specified in dB is determined by  
 Numeric gain (G)=10^(antenna gain/10)

According to specification 3GPP TS 51.010, the maximum power of the GSM can do the power reduction for the multi-slot. The allowed power reduction in the multi-slot configuration is as following:

Number of timeslots in uplink assignment	Permissible nominal reduction of maximum output power (dB)
1	0
2	0 to 3,0
3	1,8 to 4,8
4	3,0 to 6,0

Each Tx slots maximum tune up use the most strictest factor for evaluation by making calculation.

Band		Burst-Averaged output power (adjusted for tune up) (dBm)	Division Factors	Frame-Averaged output power (adjusted for tune up) (dBm)
GSM850	GSM	35.00	-9.03	25.97
	1 Txslot	35.00	-9.03	25.97
	2 Txslots	35.00	-6.02	28.98
	3 Txslots	33.20	-4.26	28.94
	4 Txslots	32.00	-3.01	<b>28.99</b>
GSM1900	GSM	32.00	-9.03	22.97
	1 Txslot	32.00	-9.03	22.97
	2 Txslots	32.00	-6.02	<b>25.98</b>
	3 Txslots	30.20	-4.26	25.94
	4 Txslots	29.00	-3.01	25.99

Note:

Division Factors

To average the power, the division factor is as follows:

1Txslot = 1 transmit time slot out of 8 time slots

=> conducted power divided by (8/1) => -9.03 dB

2Txslots = 2 transmit time slots out of 8 time slots

=> conducted power divided by (8/2) => -6.02 dB

3Txslots = 3 transmit time slots out of 8 time slots

=> conducted power divided by (8/3) => -4.26 dB

4Txslots = 4 transmit time slots out of 8 time slots

=> conducted power divided by (8/4) => -3.01 dB

Band	Maximum Tune up Power		Antenna Gain (dBi)	Numeric Gain
	(dBm)	(mW)		
GSM 850	28.99	792.50	1.70	1.48
GSM 1900	25.98	396.28	1.04	1.27
LTE-M Band 2	22.00	158.49	1.04	1.27
LTE-M Band 4	22.00	158.49	0.97	1.25
LTE-M Band 5	22.00	158.49	1.70	1.48
LTE-M Band 12	22.00	158.49	1.13	1.30
LTE-M Band 13	22.00	158.49	1.13	1.30
LTE-M Band 25	22.00	158.49	1.04	1.27
LTE-M Band 66	22.00	158.49	0.97	1.25
LTE-M Band 85	22.00	158.49	1.13	1.30
NB-IoT Band 2	22.00	158.49	1.04	1.27
NB-IoT Band 4	22.00	158.49	0.97	1.25
NB-IoT Band 5	22.00	158.49	1.70	1.48
NB-IoT Band 12	22.00	158.49	1.13	1.30
NB-IoT Band 13	22.00	158.49	1.13	1.30
NB-IoT Band 25	22.00	158.49	1.04	1.27
NB-IoT Band 66	22.00	158.49	0.97	1.25
NB-IoT Band 71	22.00	158.49	0.50	1.12
NB-IoT Band 85	22.00	158.49	1.13	1.30
Band	Maximum Output Power		Antenna Gain (dBi)	Numeric Gain
	(dBm)	(mW)		
Bluetooth	-5.26	0.30	2.00	1.58
Bluetooth LE	-14.25	0.04	2.00	1.58



## 4 MPE Limit

According to section 1.1310 of FCC 47 CFR Part 1, limits for maximum permissible exposure (MPE) are as following.

TABLE 1 – LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Averaging Time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0 .....	614	1.63	*(100)	6
3-30 .....	1842/f	4.89/f	*(900/f <sup>2</sup> )	6
30-300 .....	61.4	0.163	1.0	6
300-1500 .....			f/300	6
1500-100,000 .....			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34 .....	614	1.63	*(100)	30
1.34-30 .....	824/f	2.19/f	*(180/f <sup>2</sup> )	30
30-300 .....	27.5	0.073	0.2	30
300-1500 .....			f/1500	30
1500-100,000 .....			1.0	30

f = frequency in MHz

\* = Plane-wave equivalent power density

Note1. Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational / controlled limits apply provided he or she is made aware of the potential for exposure.

Note2: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

The maximum permissible exposure for 300~1500 MHz is  $f/1500$ , for 1500~100,000MHz is 1.0.

So

Band	The Maximum Permissible Exposure (mW/cm <sup>2</sup> )
GSM850	0.549
GSM1900	1.000
LTE-M Band 2	1.000
LTE-M Band 4	1.000
LTE-M Band 5	0.549
LTE-M Band 12	0.466
LTE-M Band 13	0.518
LTE-M Band 25	1.000
LTE-M Band 66	1.000
LTE-M Band 85	0.465
NB-IoT Band 2	1.000
NB-IoT Band 4	1.000
NB-IoT Band 5	0.549
NB-IoT Band 12	0.466
NB-IoT Band 13	0.518
NB-IoT Band 25	1.000
NB-IoT Band 66	1.000
NB-IoT Band 71	0.442
NB-IoT Band 85	0.465
Bluetooth	1.000
Bluetooth LE	1.000

## 5 RF Exposure Evaluation Result

RF exposure evaluation method is based on KDB 447498 D01, this calculation is based on the conducted power, maximum power and antenna gain with provides the minimum separation distance. The formula shown below is from OET Bulletin 65 Edition 97-01 Per KDB 447498 D01:

$$S = PG / 4\pi R^2$$

Where: S = power density (in appropriate units, e.g. mW/cm<sup>2</sup>)

P = Time-average maximum tune up procedure (in appropriate units, e.g., mW)

G = the numeric gain of the antenna

R = distance to the center of radiation of the antenna (20 cm = limit for MPE)

Band	Maximum Tune up (dBm)	Antenna Gain (dBi)	Maximum EIRP (dBm)	PG (mW)	Result (mW/cm <sup>2</sup> )	Limit Value (mW/cm <sup>2</sup> )	The MPE Ratio
GSM 850	28.99	1.70	30.69	1172.20	0.23	0.549	<b>0.43</b>
GSM 1900	25.98	1.04	27.02	503.50	0.10	1.000	0.10
LTE-M Band 2	22.00	1.04	23.04	201.37	0.04	1.000	0.04
LTE-M Band 4	22.00	0.97	22.97	198.15	0.04	1.000	0.04
LTE-M Band 5	22.00	1.70	23.70	234.42	0.05	0.549	0.08
LTE-M Band 12	22.00	1.13	23.13	205.59	0.04	0.466	0.09
LTE-M Band 13	22.00	1.13	23.13	205.59	0.04	0.518	0.08
LTE-M Band 25	22.00	1.04	23.04	201.37	0.04	1.000	0.04
LTE-M Band 66	22.00	0.97	22.97	198.15	0.04	1.000	0.04
LTE-M Band 85	22.00	1.13	23.13	205.59	0.04	0.465	0.09
NB-IoT Band 2	22.00	1.04	23.04	201.37	0.04	1.000	0.04
NB-IoT Band 4	22.00	0.97	22.97	198.15	0.04	1.000	0.04
NB-IoT Band 5	22.00	1.70	23.70	234.42	0.05	0.549	0.08
NB-IoT Band 12	22.00	1.13	23.13	205.59	0.04	0.466	0.09
NB-IoT Band 13	22.00	1.13	23.13	205.59	0.04	0.518	0.08
NB-IoT Band 25	22.00	1.04	23.04	201.37	0.04	1.000	0.04
NB-IoT Band 66	22.00	0.97	22.97	198.15	0.04	1.000	0.04
NB-IoT Band 71	22.00	0.50	22.50	177.83	0.04	0.442	0.08
NB-IoT Band 85	22.00	1.13	23.13	205.59	0.04	0.465	0.09

Band	Maximum Output Power (dBm)	Antenna Gain (dBi)	Maximum EIRP (dBm)	PG (mW)	Result (mW/cm <sup>2</sup> )	Limit Value (mW/cm <sup>2</sup> )	The MPE Ratio
Bluetooth	-5.26	2.00	-3.26	0.47	0.00009	1.000	<b>0.00009</b>
Bluetooth LE	-14.25	2.00	-12.25	0.06	0.00001	1.000	0.00001
Note: $R = 20\text{cm}$ $\pi = 3.1416$ The MPE Ratio = Mac Result $\div$ Limit Value							

So the simultaneous transmitting antenna pairs as below:

$$\sum \text{of MPE ratios} = \text{Main Antenna} + \text{Bluetooth} = 0.43 + 0.00009 = 0.43009 < 1$$

Note: For transmitters, minimum separation distance is 20cm, even if calculations indicate MPE distance is less.

## **ANNEX A: The EUT Appearance**

The EUT Appearance are submitted separately.

**\*\*\*\*\*END OF REPORT \*\*\*\*\***